

COUNTY REINSURANCE, LIMITED

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# Flood Emergency Response Planning

## July 15, 2021

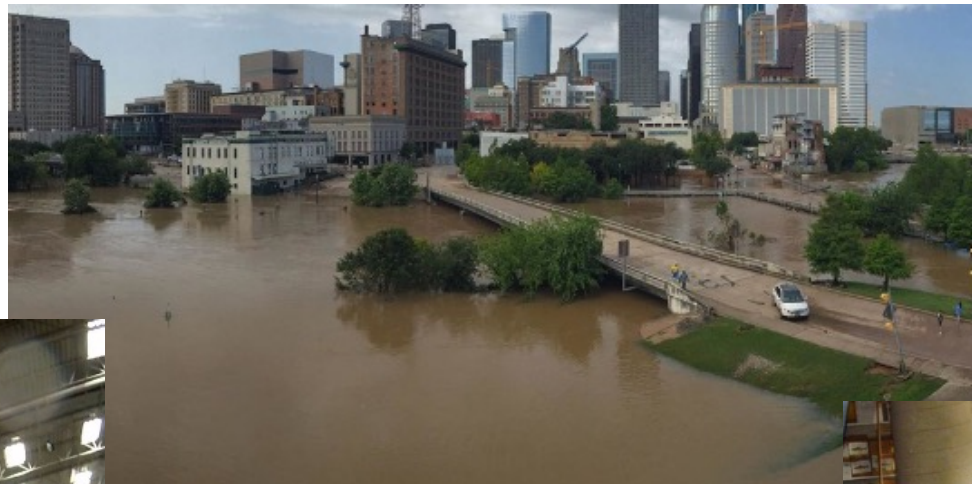


SOLUTIONS...DEFINED, DESIGNED, AND DELIVERED.



# CAUSES OF WATER DAMAGE

- Bursting or leaking pipes
- Issues with the plumbing system – sewer backup
- Buildup in areas prone to collecting water, such as crawl spaces, attics and basements
- HVACs (Heating, ventilating and air conditioning units) issues
- **Natural disasters and other weather-related water flooding**
- Burst sprinkler pipes



## FLOOD EMERGENCY RESPONSE PLAN (FERP)

A Flood Emergency Response Plan (FERP) is an important tool to help reduce the impact of flood damage of a natural hazard to your property, business and employees

An effective flood emergency response plan, when properly executed, can greatly reduce potential property damage and business interruption. Most flooding events allow an adequate warning period to implement an effective emergency response plan. This warning period is an important factor to consider in the development of the plan. Once the response plan is developed, train all involved staff, practice the plan, and learn from the things that work well and from those that do not. Outside emergency response services should be involved in the planning and training. Effectiveness of the plan is contingent upon support from upper management\*



# FLOOD EMERGENCY RESPONSE PLAN

## Basic Plan Requirements

1. Risk Assessment – understanding the location exposure.
2. Prevention, Protection, Preparation - steps taken to reduce exposure to building, equipment, stock and personnel.
3. Flood recovery - identify key resources required to preserve property and restore/return site back to operations.



A washed out bridge is shown Sept. 21, 2009, in Douglasville, Ga. Heavy rain caused flooding in and around the Atlanta area.



## FLOOD EMERGENCY RESPONSE PLAN

- ✓ Designate a person / persons responsible for the creation, maintenance, supervision and implementation of the plan, along with alternates.
- ✓ Develop a team to meet the demands of Assessment, Prevention, Protection, Preparation and Recovery
- ✓ Establish needed resources outside of members to provide needed support and recovery.



Water overruns the Sanford Dam in Michigan on Tuesday. The National Weather Service called the flooding "extremely dangerous" and said it was caused by "catastrophic failures" at two dams.

*TC Vortex via Reuters*

## RISK ASSESSMENT

Site specific assessment of the impact and probability of a flood event and what may be the causal factors leading to such an event.

- What Weather event might cause flooding, surface water or storm surge .
- Determine from where and how the flood water will enter the building.
- Obtain local flood maps identifying the campus location and the resultant flood exposure. (FEMA / FM / NOAA)
- Determine the type of flooding and the behavior of the water as it enters and exits the site. (River, coastal or large water mass like pond or lake)
- How much warning time may you have before onset of flooding.
- How long might the flooding persist at the building (flash flooding, storm surge, longer duration flooding, etc.).

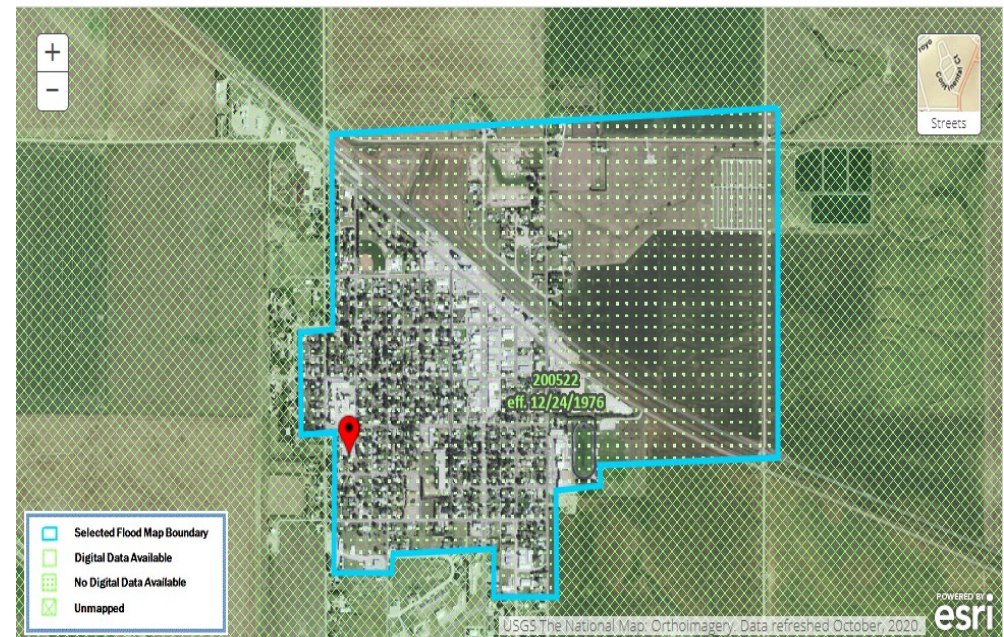
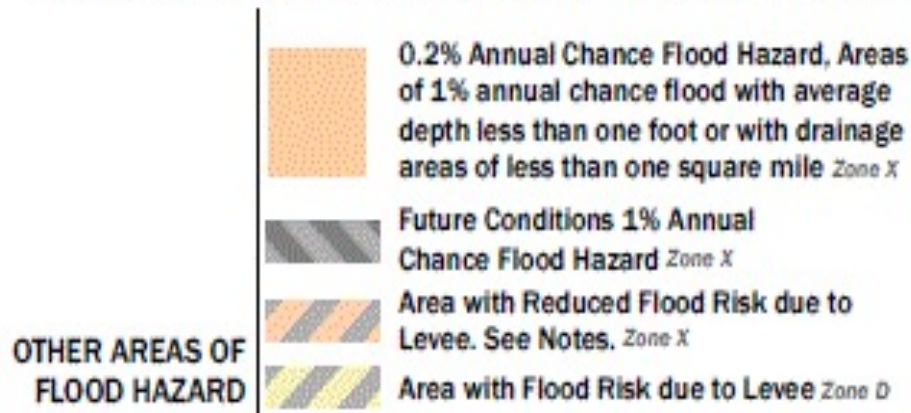
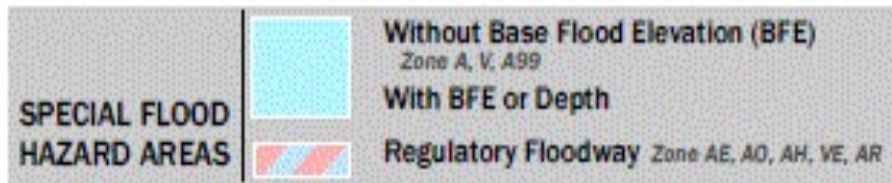
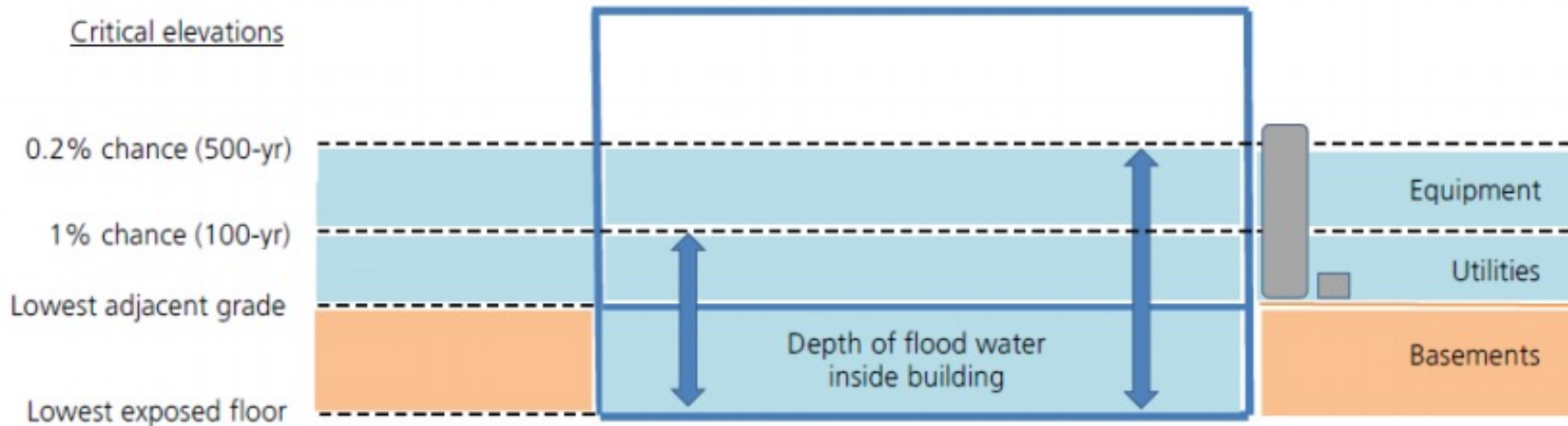
How deep may the resulting flood water rise on property and within buildings, including 1 percent (100 year) and 0.2 percent (500 year or storm surge).

– Obtain finished floor elevations (FFE) of key buildings or infrastructure at the affect building (utilities, sewers, storm drains, fire pumps, generators) and compare them to the expected flood levels. (FFE can be located on building drawings)



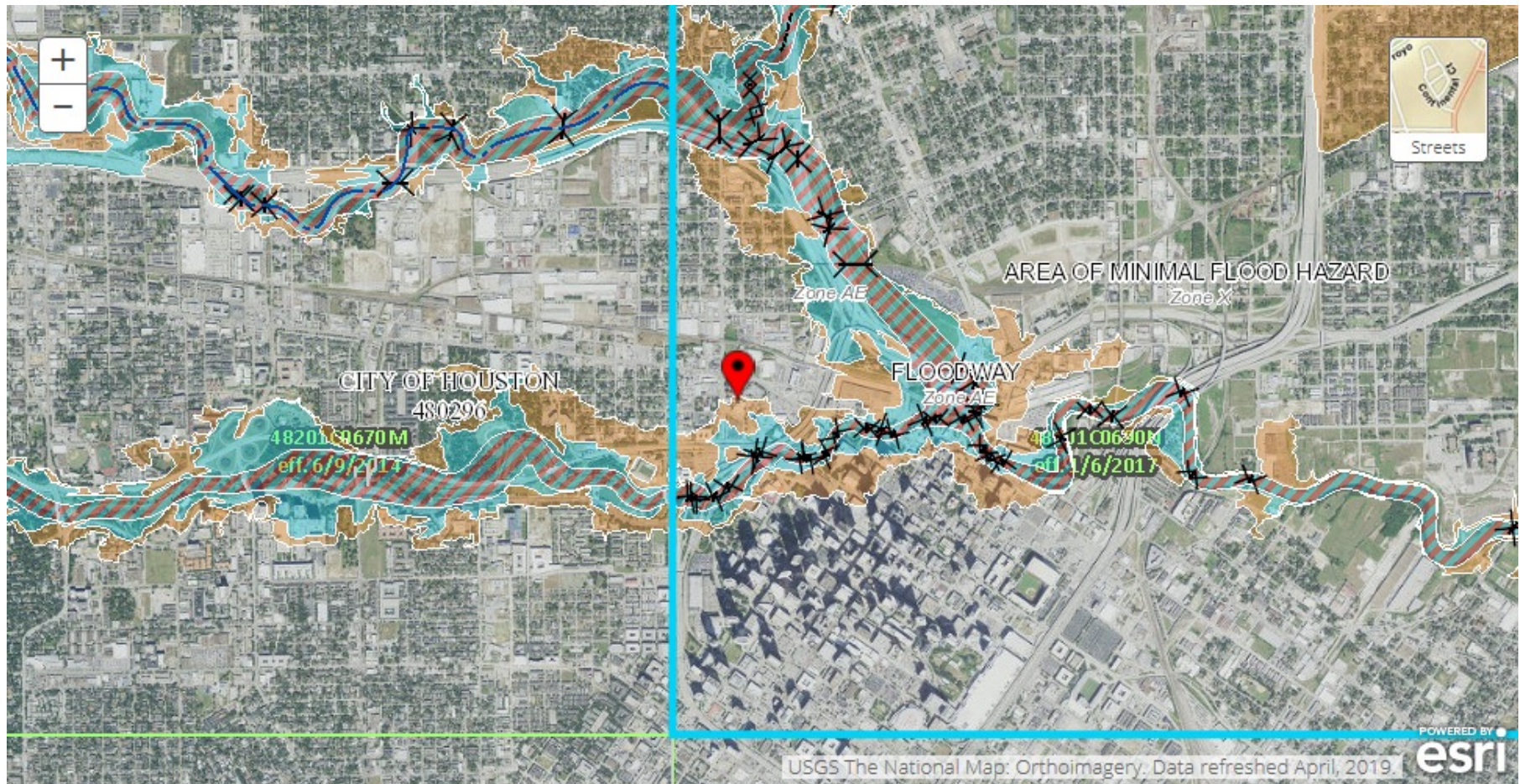


# UNDERSTANDING ELEVATIONS





# DETERMINATION FLOOD EXPOSURE



Houston Municipal Court

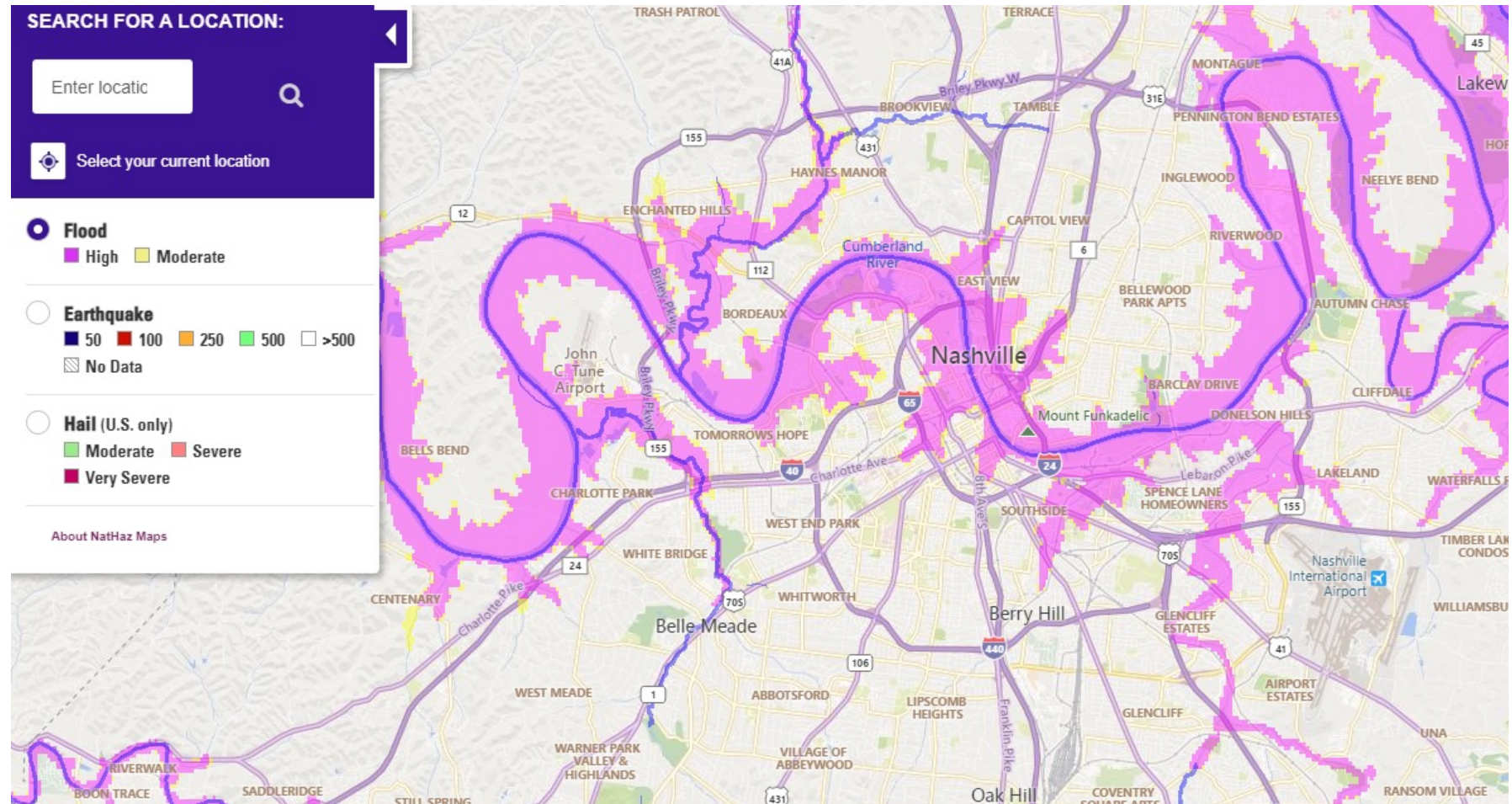
<https://msc.fema.gov/portal/search?AddressQuery>







# FLOOD MAP – FM GLOBAL



Natural Hazards Map (fmglobal.com) - <https://www.fmglobal.com/research-and-resources/nathaz-toolkit/flood-map>



## PLAN DEVELOPMENT

- Determine the best means to protect high value, important/critical buildings and infrastructure (flood walls, flood proofing, sandbags, etc.)
- Identify decisions required by higher levels of management may be needed to actuate certain activities (shut down of facilities or vulnerable processes.)
- Staffing should be selected to complete the emergency actions on all shifts/days.
  - Determine time requirements for specific tasks.
  - Consider important holidays and vacation seasons
- Resources and supplies should be readily available or staged for the emergency response team members.
- Develop well thought out and developed action plan steps.
  - Develop concise actions with assignment to specific individuals and teams.
  - Concise actions steps to help prevent water entry into buildings, relocate stock or important equipment.
  - Prioritize actions and efforts to protect the most important and most valuable operations, stock or equipment at your facility.
- Develop checklists and action items that can be printed off and used in the field
- Consideration should be developed for potential loss of power and denial of access in the affected area.
- Flash type flooding will likely have a short window of time for effective emergency response, so more staffing or more permanent and reliable mitigation modifications to the site or the building may be needed.
- Identify service providers to work with in recovery stages
- Formalize the plan in writing, dry-run the entire plan and provide regular training exercises for staff and equipment.

## PLAN DETAILS AND OPERATION

- Develop a tiered action plan for the FERP. Each level should be well developed and thought out as to the time frame and exposure that exists. Keep in mind time frames can change rapidly depending on threat development.



- At each level develop actions, steps and activities that must be taken and assign those to specific individuals and teams.



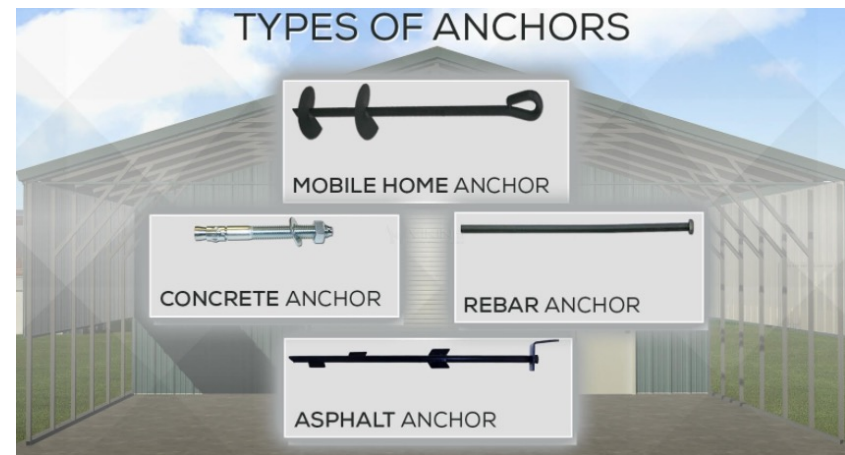
## WATCH PHASE

- Fill fuel tanks serving emergency generators and other vital services
- Verify dewatering / sump pumps are in service and working
- Verify outside drains and catch basins are clean (exterior and roof inspections)
- Verifying all fire protection systems are in service
- Inspect and ensure proper staging of emergency equipment in safe locations
- Discuss with staff the flood potential ensure proper staffing and equipment
- Dry run critical tasks
- Check in with local emergency services and any recovery companies (See resources)
- Stay in contact with service providers on status and potential needs (Cleaning, utilities ext.)



## WARNING PHASE

- Protect or relocate vital business records
- Remove all loose outdoor storage or equipment
- Anchor portable buildings or trailers to the ground
- Secure outdoor storage or equipment that cannot be moved
- Start the installation of manual protection systems such as flood gates
- Raise critical equipment off floor
- Move critical equipment from below grade areas
- Turn off fuel gas services.
- Turn off non-essential electrical systems.





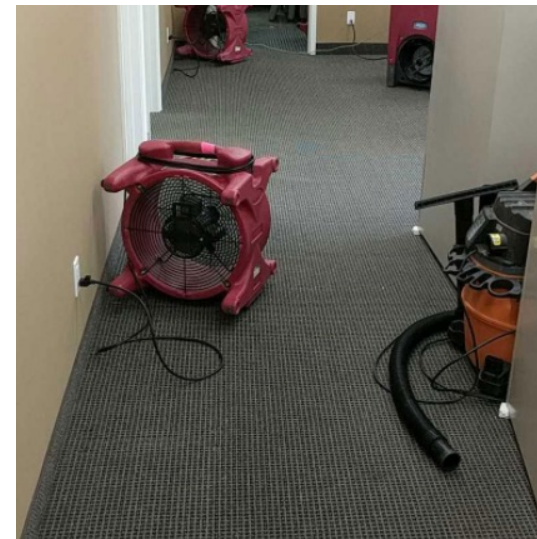
## ACTION PHASE

- Monitor systems installed to prevent flooding (Sandbags, barriers)
- Ensure fueling is maintained for pumps/generators (Sump pump in the basement)
- Monitor drains for proper flow and remove blockage. (Including roof drains)
- Monitor interior of buildings for water seepage or leaks (walls, floors and roof).
- Ensure back flow prevention is operating and valves are closed where needed.



## RECOVERY PHASE

- Work with service providers to aid in cleaning and recovery
- Survey extent of damage and develop a strategic plan or priorities to restore the most important areas or processes first.
- Initiate clean-up operations when safe to do so.
- Utilize additional personnel and specialized contractors and vendors to help speed the clean-up and recovery operations.
- Have all utilities checked by qualified personnel before use.
- Contact utility companies to restore services
- Verifying all fire protection systems are in service



# HOW TO PROTECT YOUR BUILDINGS

Protection designed to mitigate flood hazards can be grouped into three categories:

- **Passive**
- **Active**
- **Manual**

**Passive** protection include:

- Grading
- Berms
- Fixed flood walls
- Permanent physical barriers to direct water away
- Automatic flood gates (hydrostatic)
- Levees

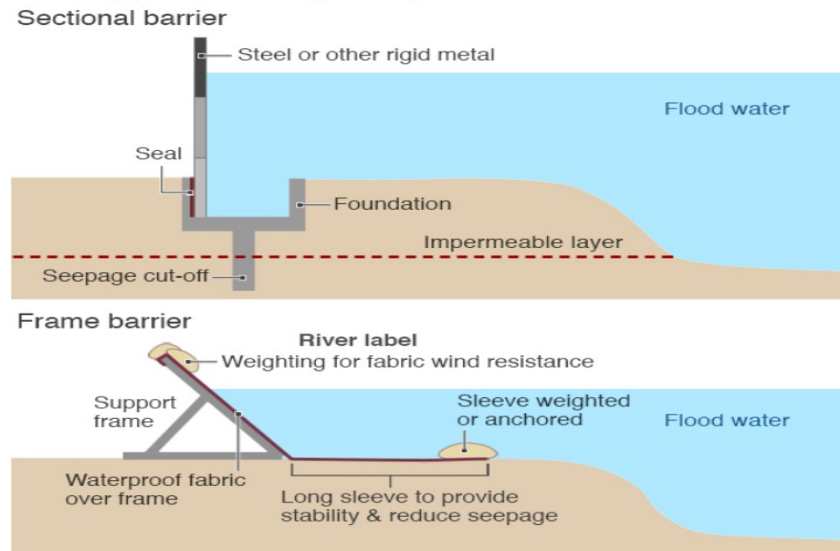
**Active** protection include:

- Mechanical de-watering methods (e.g. sump pumps serving basement levels, truck docks, and similar low lying areas).

**Manual** protection include:

- Flood gates/shields or flood barriers (set in place when heavy rain or storm is anticipated).
- Sand bags

**Two types of temporary flood barrier**



\* Flood protection should be designed for the 500 year flood level plus 2 ft. of freeboard



## Manual protection

Presray



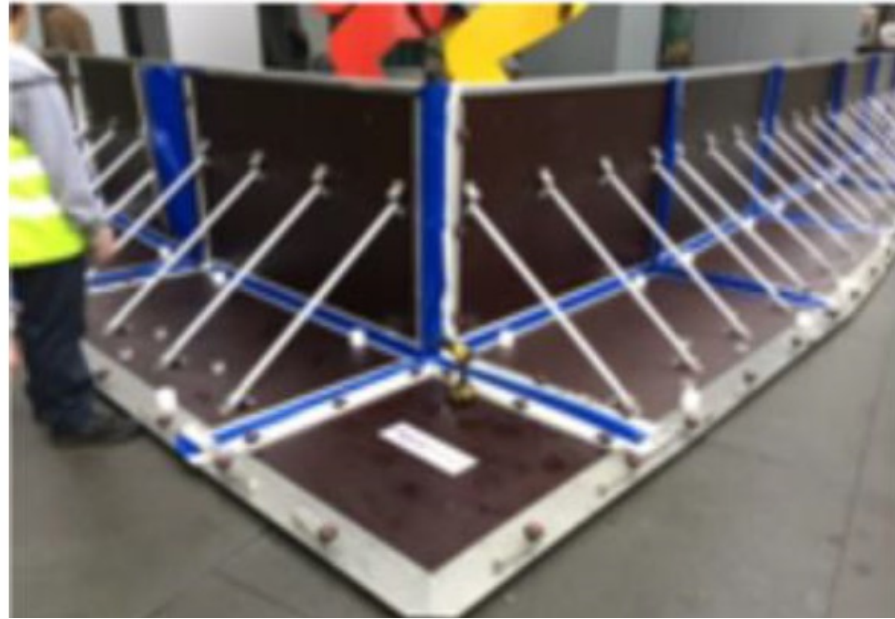
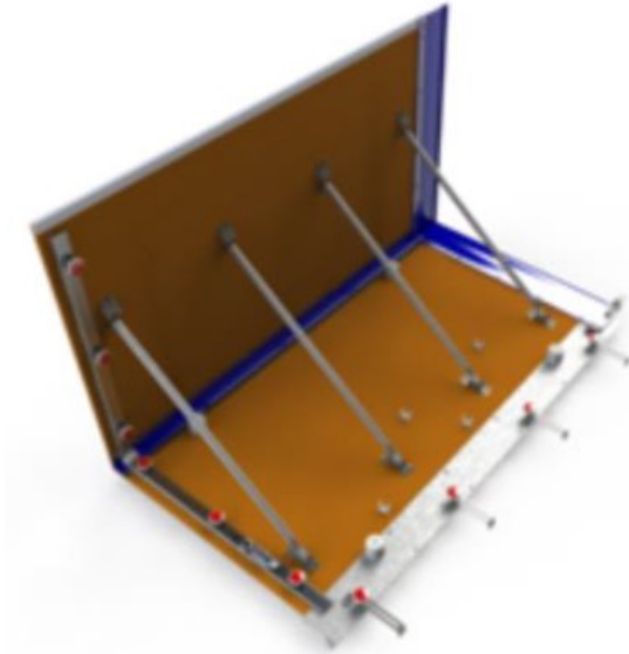
[www.presray.com/flood-barriers-floodgates](http://www.presray.com/flood-barriers-floodgates)

## PS Doors



<https://www.psfloodbarriers.com>

## AquaFence



### Standard Heights

<https://aquafence.com>

AquaFence FloodWalls can transition between heights and **range from 2.5' to 9'**.





## TigerDam



[https://usfloodcontrol.com/42"-fm-approved-tiger-dam/](https://usfloodcontrol.com/42)

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## TO MITIGATE OTHER WATER INTRUSION ISSUES:

### **Roof:**

Inspect and perform temporary repairs as needed. If the roof has deteriorated to the point where re-roofing is necessary, either install a permanent roof if funding permits, or install a temporary roof.

### **Gutters, downspouts, and drains:**

Gutters and roof drains should be cleared of debris. Repair sections of gutter that are missing or damaged. Repair missing and damaged downspouts and reconnect to the storm drainage system, if available.

### **Flashing and trim:**

Missing or damaged flashing should be repaired or replaced.

### **Doors and windows:**

Exterior openings such as doors, windows, and louvers must also be minimally restored. Missing shutters should be replaced and all shutters closed and secured. Wood windows and other wood components suffering from rot, damage, or missing glass panes should be replaced. Glazing compound that has deteriorated to the point where the weather is no longer being excluded at the perimeters of the glass panes should be repaired. Operating hardware such as handles, locks, and latches should be replaced if missing or nonfunctional. Sealants between the window perimeters and the surrounding surfaces that have deteriorated to the point where the weather is no longer being excluded should be replaced. Missing doors, including hardware, should be replaced to keep wind and rain out. As a less expensive alternative, windows could be boarded (either all windows or only missing windows) until implementation of an adaptive reuse.

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## TO MITIGATE WATER INTRUSION ISSUES:

### **Wood siding and trim:**

Wood siding and trim needs to be reattached where loose to prevent further loss from wind. Wood should be painted to protect it from the elements.

### **Wood flooring:**

It could be worthwhile to remove the occasional floorboard to allow for expansion to occur from swelling, without causing permanent damage to the boards if there is a potential for flooding.

### **Masonry walls:**

Secure masonry veneers into the façade if they are in danger of falling out; concentrate on those whose deterioration allows water or vermin entry, or where pieces are in danger of falling and causing injury. Execute a regimen of selective tuck pointing of deteriorated mortar at selected areas of the building façade.

### **Additions and alterations:**

Building elements that have been installed relatively recently and are not historically significant but are, however, structurally sound and mostly weather tight, should remain, with some nominal repairs for the purpose of mothballing. Upon execution of an adaptive reuse or restoration, the disposition of these elements can be determined.

### **Hazardous material:**

It should be noted that some historic buildings may contain asbestos or lead-based paints; proper handling of these hazardous materials will need to be observed during both demolition and restoration.



## HOW TO PROTECT AGAINST WATER DAMAGE

Here are strategies to keep water out of the building basement.

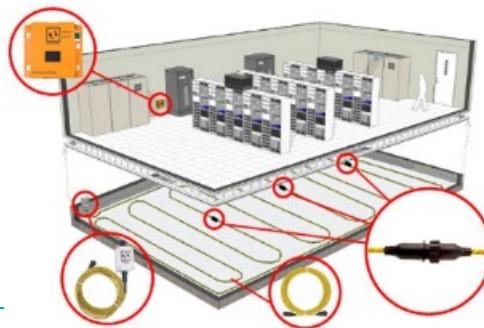
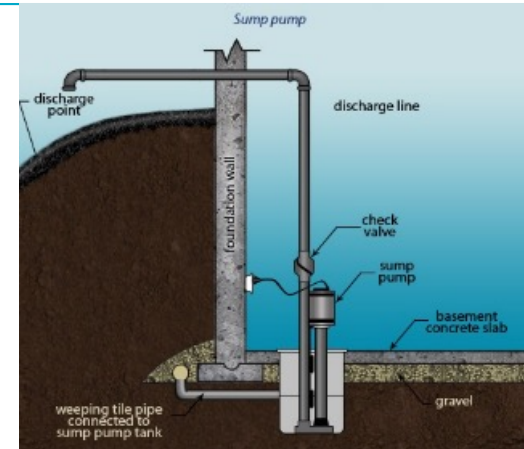
- Add Gutter Extensions
- Plug Gaps
- Reshape the Landscape
- Repair Footing Drains
- Install a Curtain Drain
- Continuous Sump Pump
- Waterproof the Walls



# HOW TO PROTECT AGAINST WATER DAMAGE

## Protection

- ❖ Provide leak detection that alarms to a constantly attended location for the following:
  - A. High-value equipment areas
  - B. Under raised floors of computer / server rooms
  - C. Critical rooms located in below-grade areas with waterlines running through them
- ❖ Provide leak detection that alarms to a constantly attended location for areas where domestic water and fire protection services enter the building and are adjacent to or above critical areas. Provide a method to collect the water, such as curbing or trenches, to ensure the leak detection device will activate promptly.
- ❖ Where domestic and chilled waterlines are directly above high-value equipment, provide lines with secondary containment, such as concentric piping. Arrange secondary containment to drain to a safe location and provide leak detection at the draining point.
- ❖ Provide sump pumps near points of water ingress or collection (i.e., low points or around open floor drains near backflow prevention valves). Use pumps that are minimum 50 gpm and connected to an appropriately sized power supply with a connection to emergency power. Provide high water-level alarms monitored at a constantly attended location.
- ❖ Air test new sprinkler systems in critical rooms and areas containing high-value equipment at low pressure prior to hydrostatic testing.



# Resources

- NOAA Weather Service River Forecasts

[NOAA - National Weather Service - Water](#)

- General Severe Weather Monitoring Weather Underground:

<https://www.wunderground.com/severe.asp>

- NOAA Storm Prediction Center:

General Information: <http://www.spc.noaa.gov/>

- To Obtain Email Alerts: <http://www.weather.gov/subscribe>

This is an excellent resource with local state and national services to obtain weather alerts for storms and severe weather.

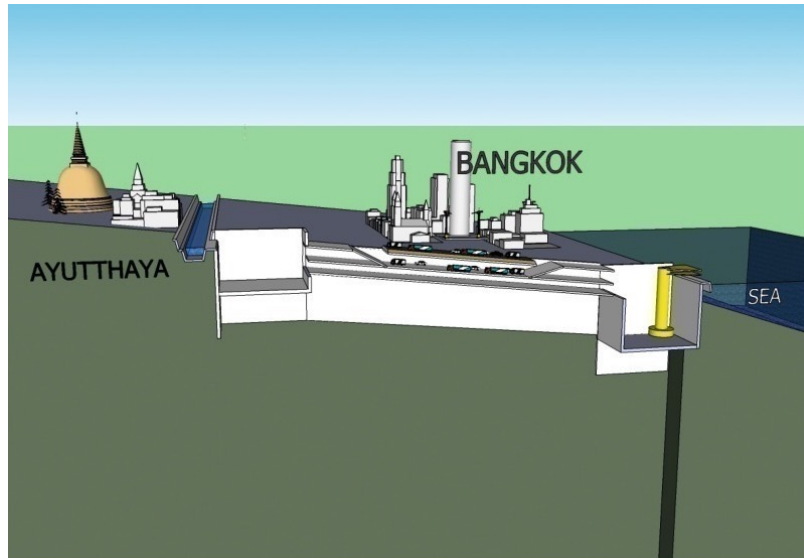
- NOAA Weather Radio: <http://www.nws.noaa.gov/nwr/>

- Accuweather: <https://alert.accuweather.com/accualert/index>

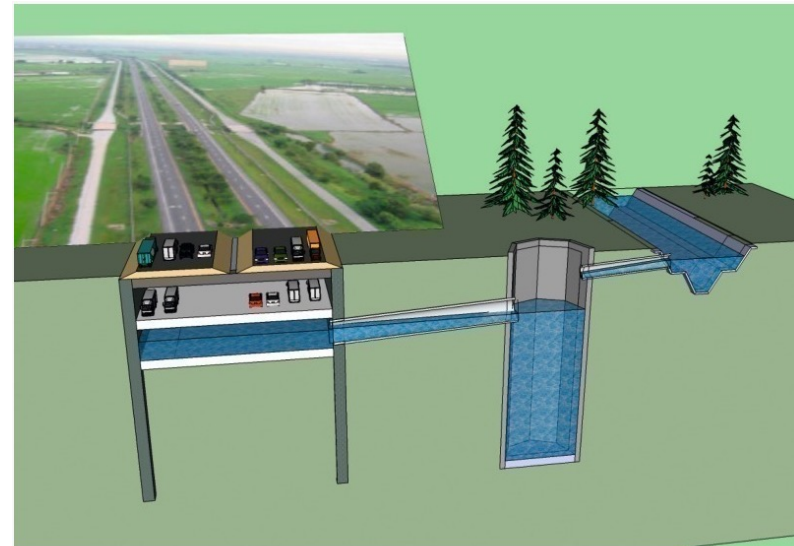




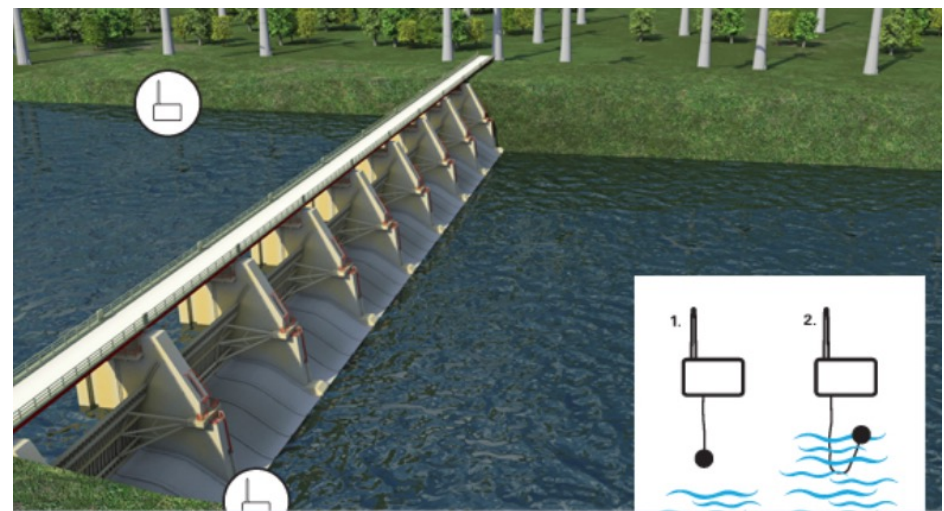
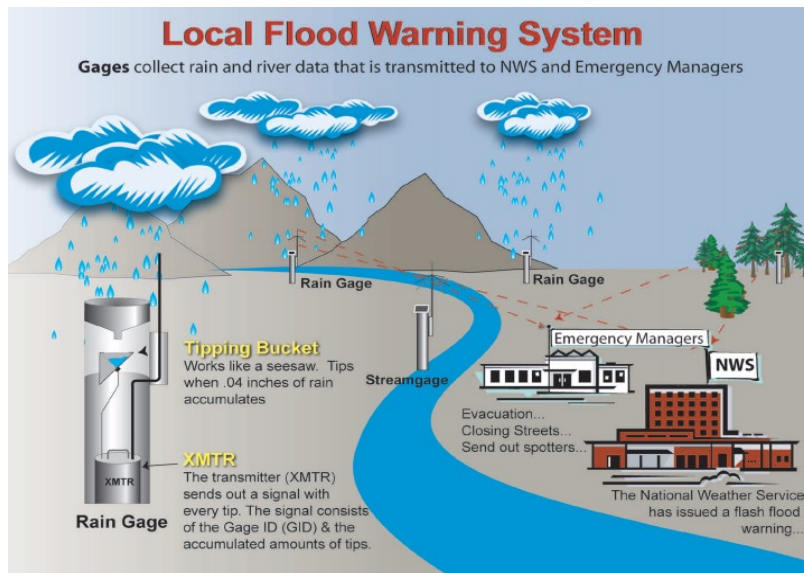
# LOOKING TO THE FUTURE



Normal or Minor Flood Situation (upper deck using as motorway, lower deck draining out)



Multipurpose Underground Service Flood Tunnel System (MUSTS)



# THANK YOU

Any questions or queries contact

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